

# **PA 295's 6 Insurmountable Hurdles**

by  
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**Interstate Informed Citizen's Coalition, Inc.  
Blissfield, MI**

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**[www.iiccusa.org](http://www.iiccusa.org)**

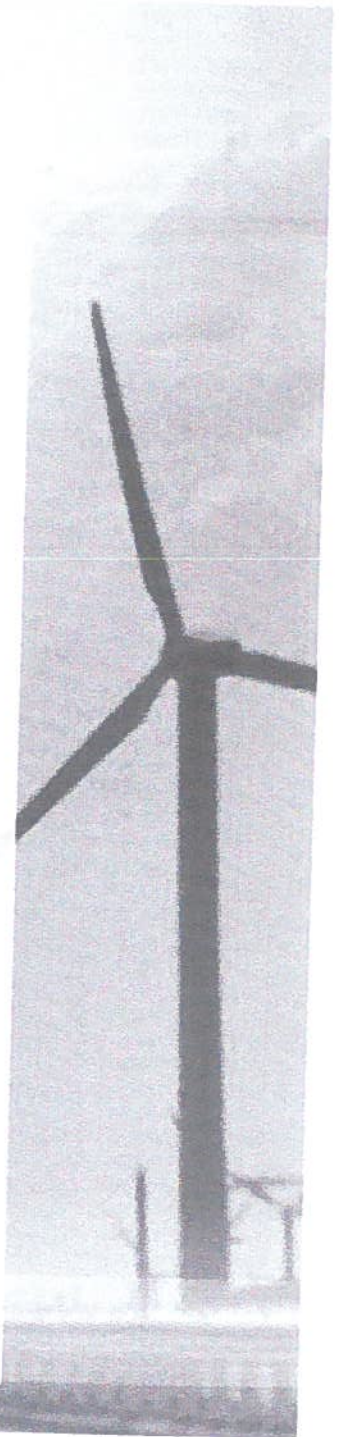
# **Who is the IICC?**

*The IICC is a bi-partisan renewable energy citizen's watchdog group based in Blissfield, MI.*

*Our constituents are approximately 40% Democratic, 60% Republican. They range from self-identified liberal environmentalists to free-market libertarians.*

*Many of our supporters live on the front lines of industrial wind development in the State of Michigan.*

*We seek energy policy that is effective economically AND environmentally.*

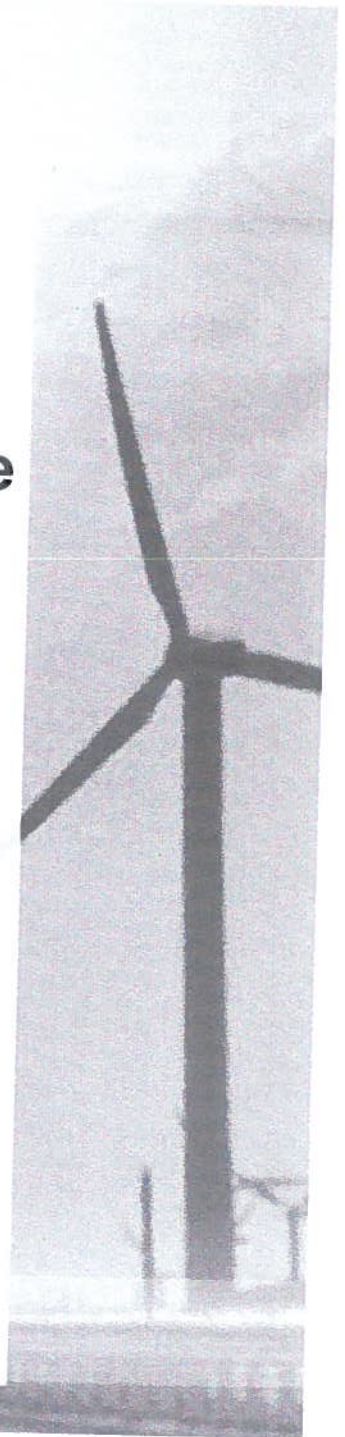




# 1<sup>st</sup> Hurdle: Unconstitutionality

1. “Michigan cannot, without violating the commerce clause of Article I of the Constitution, discriminate against out-of-state renewable energy.” –*Hon. Richard Posner, 7<sup>th</sup> Circuit*
2. “Even a state’s interest in environmental health, diverse supply, safety and energy conservation may not save facially-discriminatory state RPS or renewable incentives laws....” –*Clean Energy States Alliance*

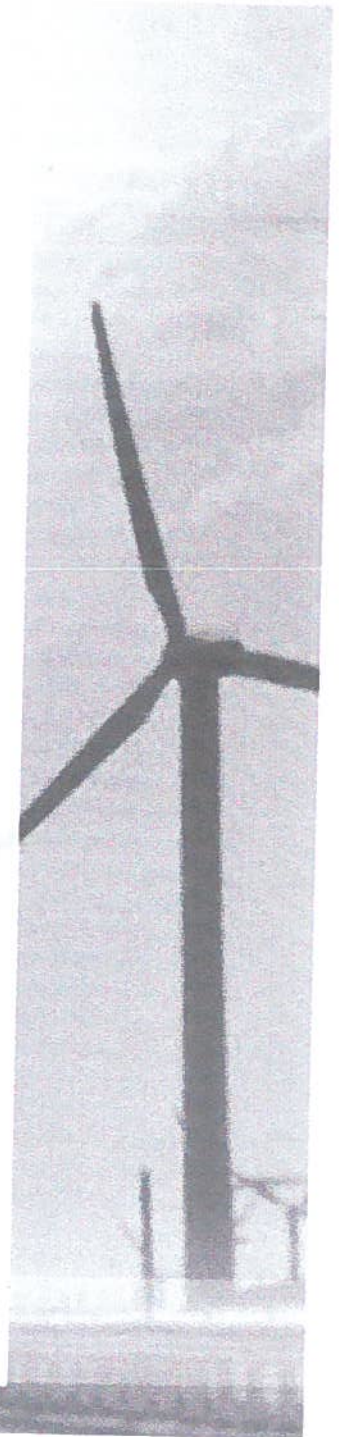
<http://www.cleanenergystates.org/assets/Uploads/CEG-Commerce-Clause-paper-031111-Final.pdf>



## **Result:**

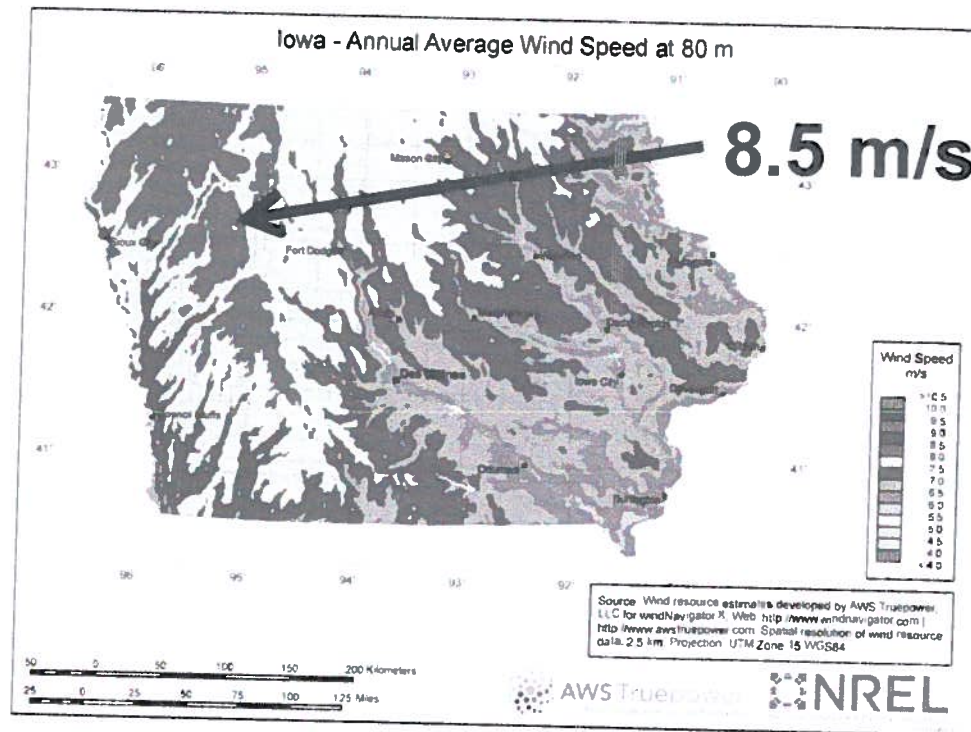
**PA295 is depriving MI utilities, cooperatives (and thus ratepayers) of their constitutional right to acquire renewable energy from the lowest cost provider anywhere in the US.**

**Yet without the ability to mandate instate generation, the promise of renewable energy mandates resulting in instate jobs growth is now in serious doubt.**



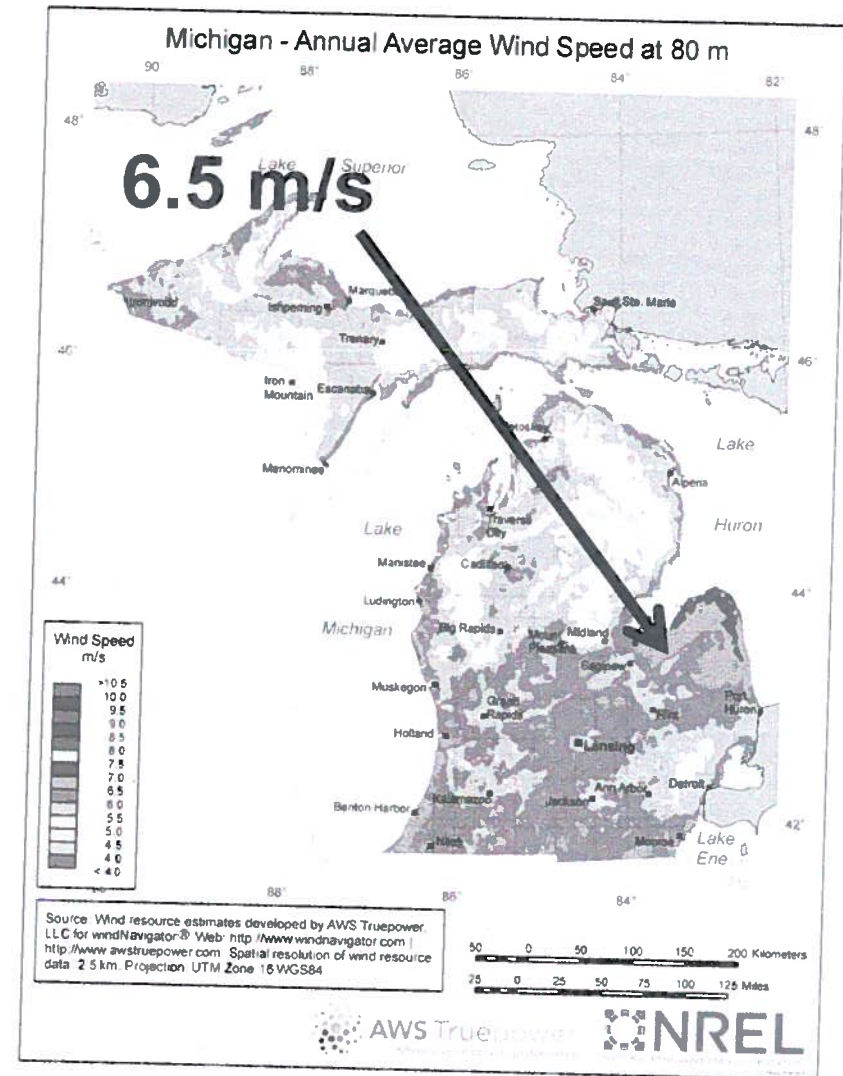


# 2<sup>nd</sup> Hurdle: MI wind noncompetitive



IA has large regions of 8.5m/s wind potential. MI has none, even @ 100m.

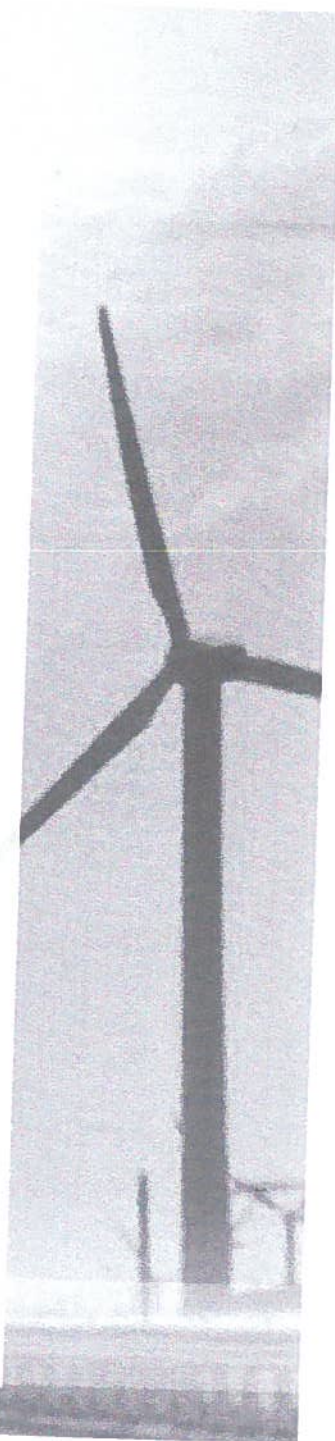
IA will produce ~2x the energy from each turbine as MI, a permanent 2:1 price disadvantage for MI



## **NREL:**

**“PPA prices are generally low in the U.S. Interior, high in the West, and in the middle in the Great Lakes and Northeast regions. The large Interior region, where much of U.S. wind project development occurs, saw average levelized PPA prices of just over \$30/MWh in 2011 and 2012”**

***MI Average PPA price is \$80/MWh.***





# **Installed Cost of Wind Generation**

**Michigan: \$2,200-2550/kw**

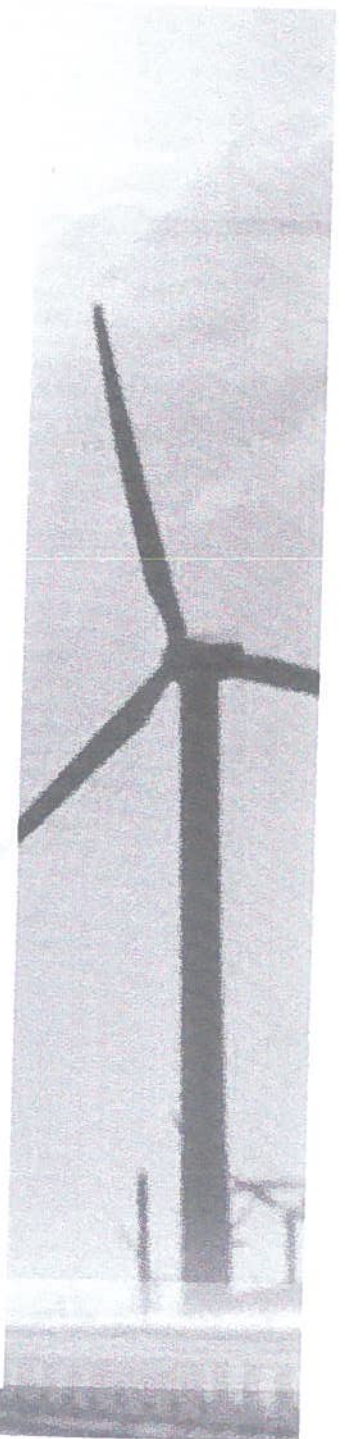
**Iowa: latest example-\$1,650.00/kw**

**This is the second driver of regionally  
uncompetitive Wind PPA pricing.**



## **Result:**

**A \$30.00/MWh Iowa wind PPA would be a cost savings of more than 60% relative to Michigan's average wind price of roughly \$80.00/MWh and far cheaper than even Michigan's current lowest priced instate wind PPA of \$49.00.**

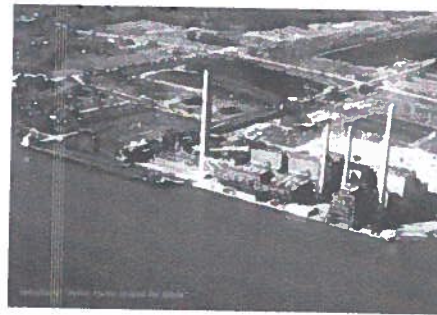




# 3<sup>rd</sup> hurdle: Wind Alone Cannot Replace Coal Generation



JH Campbell



St. Clair



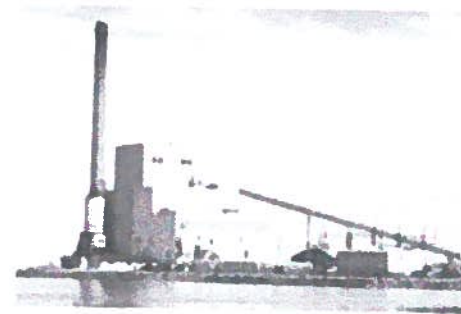
D. E. Karn



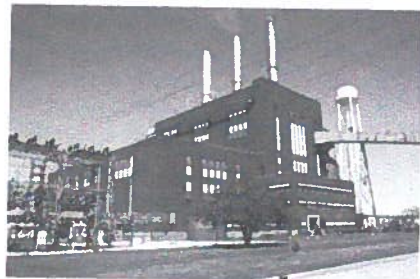
BC Cobb



JC Weadock



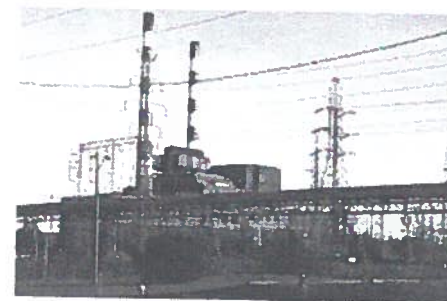
Harbor Beach



JR Whiting



River Rouge



Trenton Channel

MEC's  
Dirty 9  
Coal  
Plants:

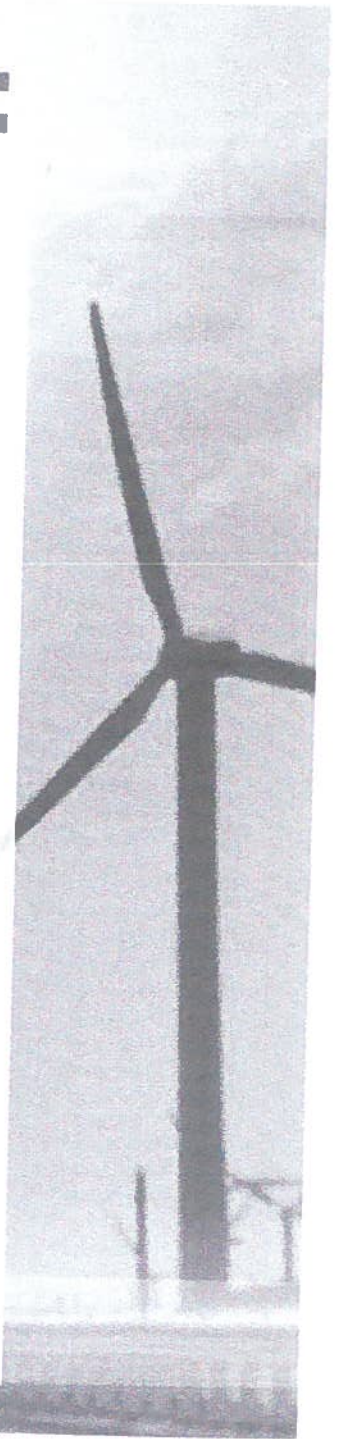
These  
plants  
have a  
total  
capacity  
of approx.  
5,000MW

# **Let's say we wish to close them:**

**There are only 4 practical ways to replace these plants while reducing their emissions:**

- 1. 5,000MW of Nuclear**
- 2. 5,000MW of CCGT**
- 3. 5,000MW of Advanced Coal w/CCS**
- 4. 5,000MW CCGT+Wind+Transmission**

**(Efficiency gains can replace some generation in the short term but not as demand grows)**



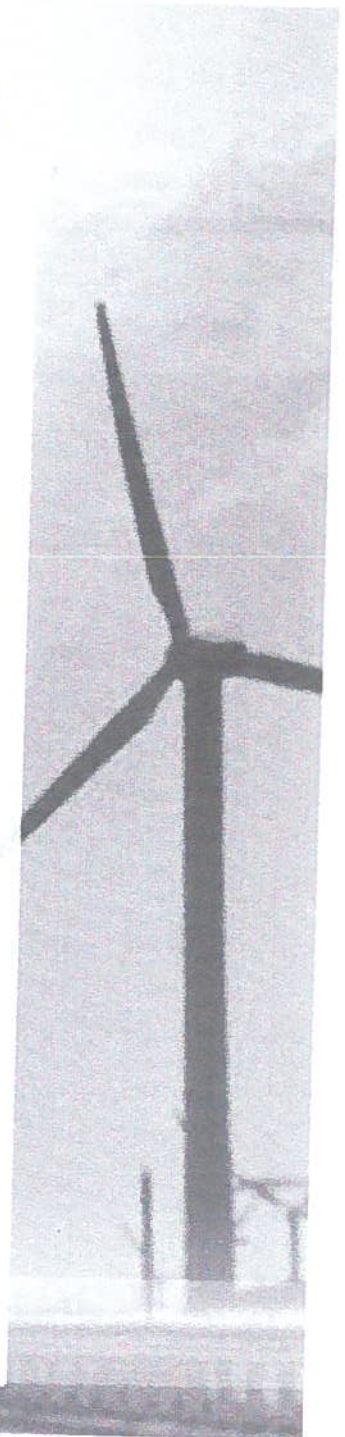


# **AWEA Board Member E. On explains:**

**"Wind energy is only able to replace traditional power stations to a limited extent.. [due to] [t]heir dependence on the prevailing wind conditions ...traditional power stations with capacities equal to 90% of the installed wind power capacity must be permanently online in order to guarantee power supply at all times"**

**E.On is a German Utility Grid operator and wind developer**

**[http://www.nerc.com/docs/pc/ivgtf/EON\\_Netz\\_Windreport2005\\_eng.pdf](http://www.nerc.com/docs/pc/ivgtf/EON_Netz_Windreport2005_eng.pdf)**

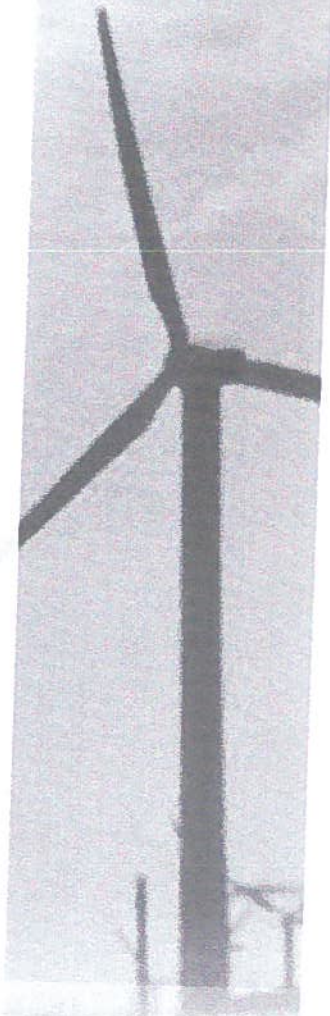


**Thus:**

**There is no such thing as wind  
generation by itself.**

**Non-dispatchable intermittent  
resources cannot replace dispatchable  
resources.**

**This has serious policy implications  
which the authors of PA295  
overlooked.**





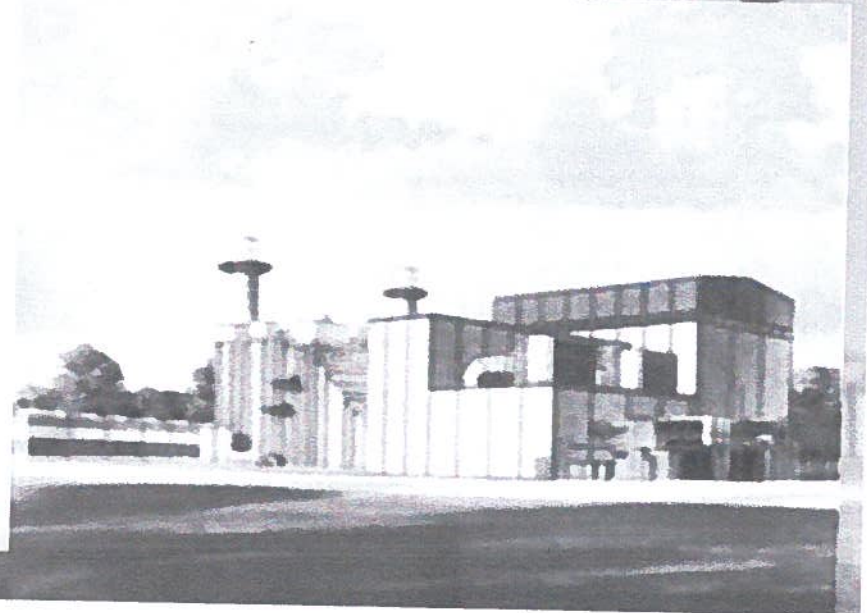
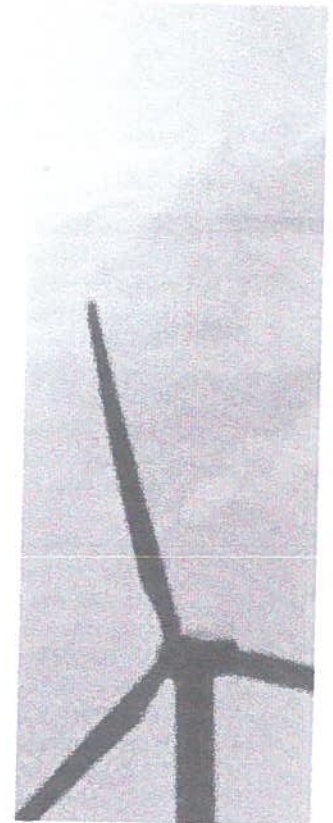
# Real World Example 1

**Despite PA295 compelling MI utilities to build >\$2 billion in wind generation by 2015, CMS has sought approval for new 750MW Thetford CCGT plant.**

**Wind did not obviate fossil.**

“The Project will also provide a fast-acting power, voltage, and regulation resource that can be used to stabilize Michigan’s electric grid in an area close to the development of many intermittent wind farms...” –CMS

<https://efile.mpsc.state.mi.us/efile/docs/17429/0001.pdf>



## Real World Example 2

MISO's Independent Market Monitor reported in July that MISO is inflating it's wind fleet's load carrying capacity and overestimating MISO reserve margins.

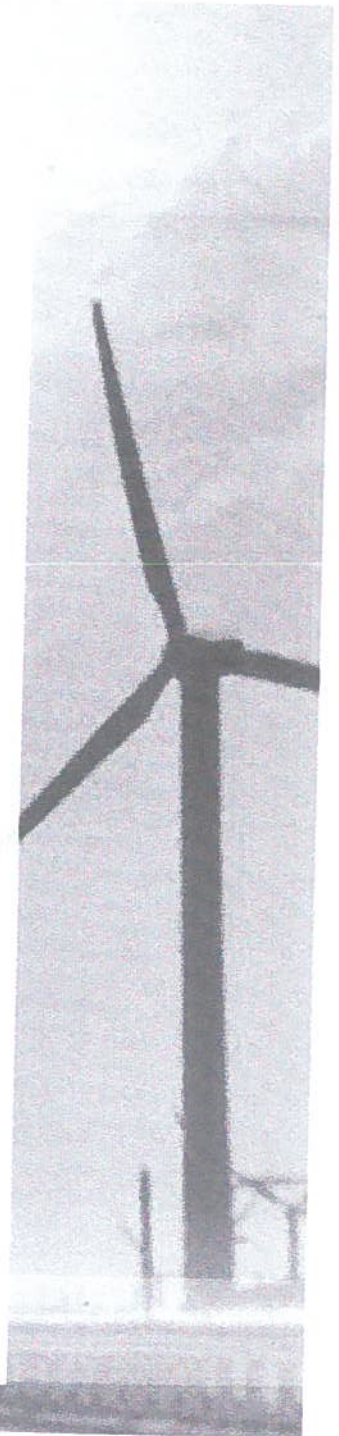
MISO Target RM: 14.2%

MISO Reported RM: 28.1%

IMM's RM: 18.7% but during hot summer perhaps as low as 6.9%

**Wind energy does not add firm capacity and thus cannot replace fossil plants.**

<http://www.platts.com/latest-news/electric-power/houston/miso-reserve-margin-lower-than-most-think-market-21260502>

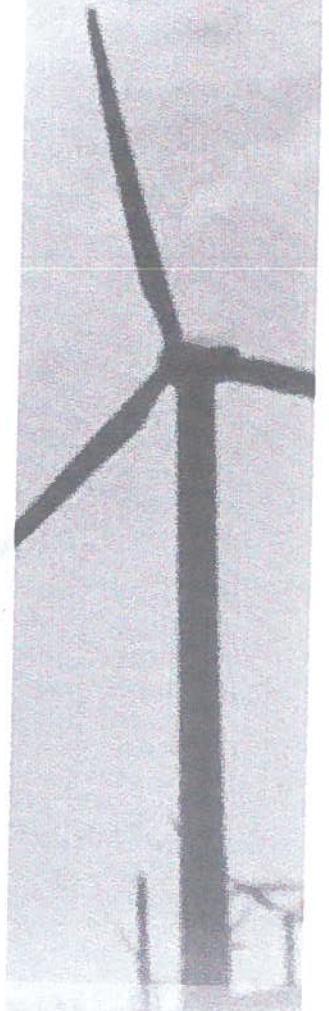




## **4th Hurdle: PA295 does not calculate cost of CO2 reduction**

**Despite the declared purpose of PA295-to create clean air- there is no requirement to empirically measure air quality improvements directly attributable to the Act nor perform comparative cost/benefit analysis.**

**Thus ratepayers and regulators cannot meaningfully assess the Act's performance.**

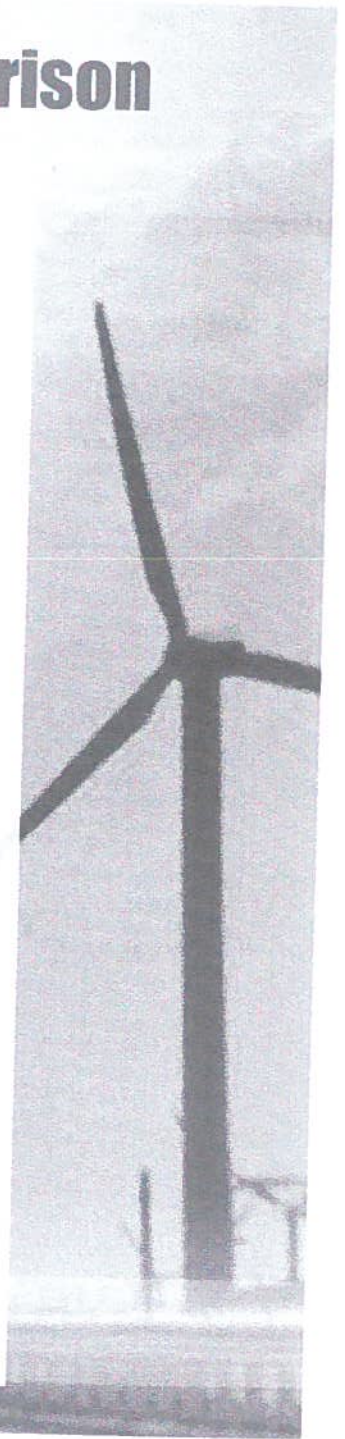


## **5th Hurdle: Act requires “meaningless” LCOE comparison**

**PA295 requires MPSC to give an annual report showing the comparative *Levelized Cost of Energy* between “wind” and “new coal”.**

**However, this erroneously assumes the two modes of generation are interchangeable but they are not.**

**Two points:**





# LCOE Ignores Value Question

“...the usefulness of simple levelized cost “rule of thumb” comparisons breaks down when the generating technologies being considered have different dispatch capabilities.... [thus] the production profiles for intermittent and dispatchable generation and the value of the electricity they produce are likely to be very different, making comparisons based on levelized cost alone meaningless”

**Dr. Paul Joskow, MIT**

*COMPARING THE COSTS OF INTERMITTENT AND DISPATCHABLE ELECTRICITY GENERATING TECHNOLOGIES*

.- [http://cadmus.eui.eu/bitstream/handle/1814/18239/RSCAS\\_2011\\_45.pdf?sequence=1](http://cadmus.eui.eu/bitstream/handle/1814/18239/RSCAS_2011_45.pdf?sequence=1)



# Here's why: wind gen inverse to demand

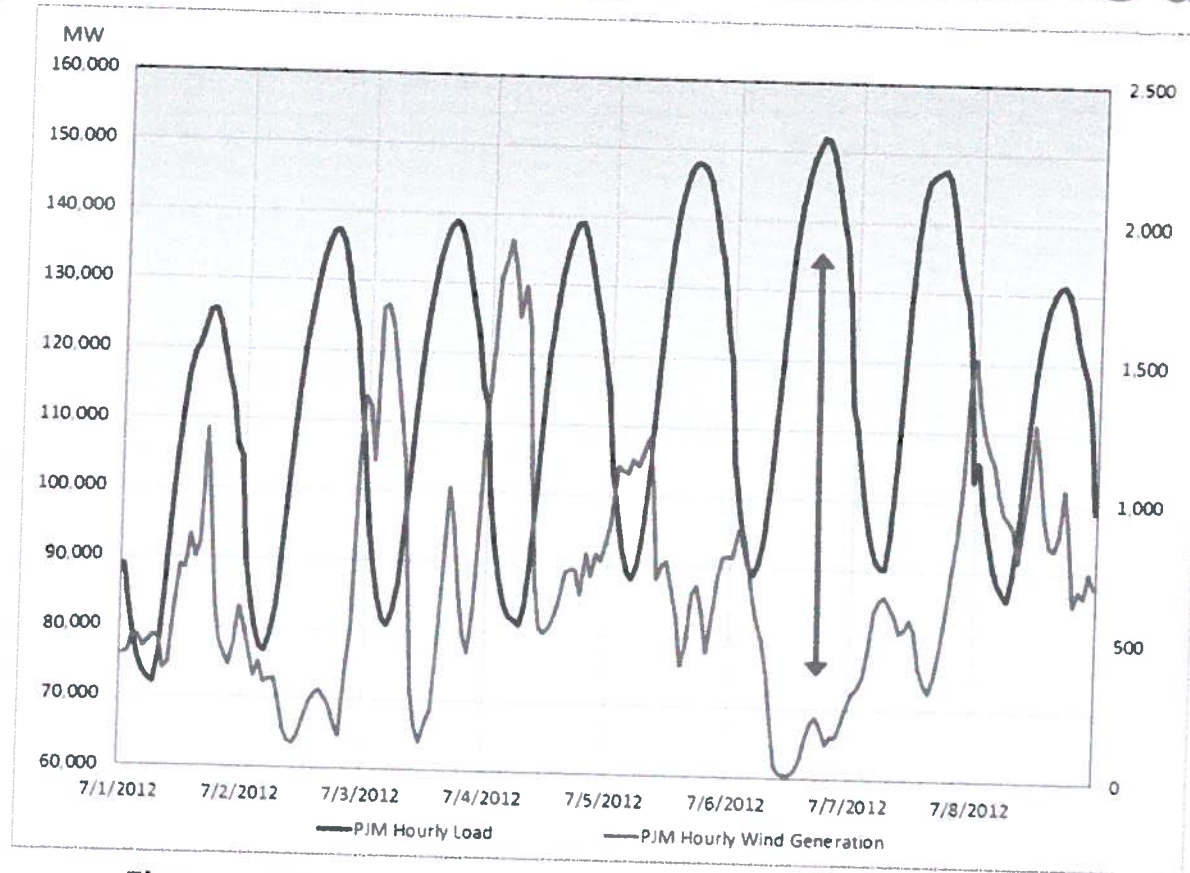
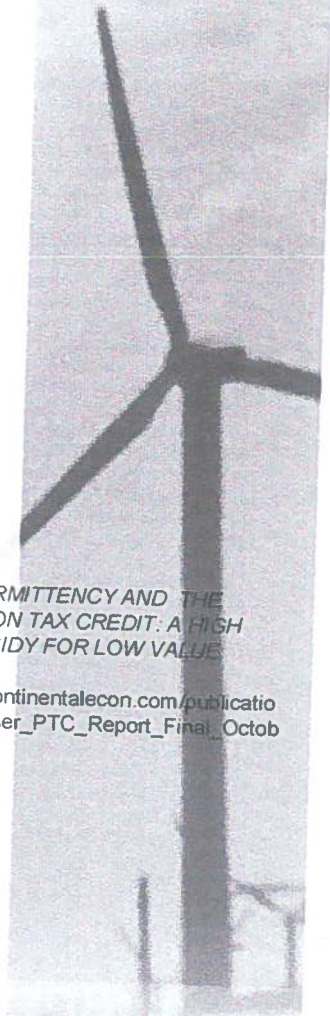


Figure 3: PJM Hourly Load and Wind Generation, July 1-8, 2012

**Historically wind generation in MISO and PJM is inverse to demand.**

**Thus, \$49-108 MI fixed-price wind is most abundant when market is offering only \$20-or less.**

WIND INTERMITTENCY AND THE  
PRODUCTION TAX CREDIT: A HIGH  
COST SUBSIDY FOR LOW VALUE  
POWER  
[http://www.continentalecon.com/publications/cebp/Lesser\\_PTC\\_Report\\_Final\\_October-2012.pdf](http://www.continentalecon.com/publications/cebp/Lesser_PTC_Report_Final_October-2012.pdf)

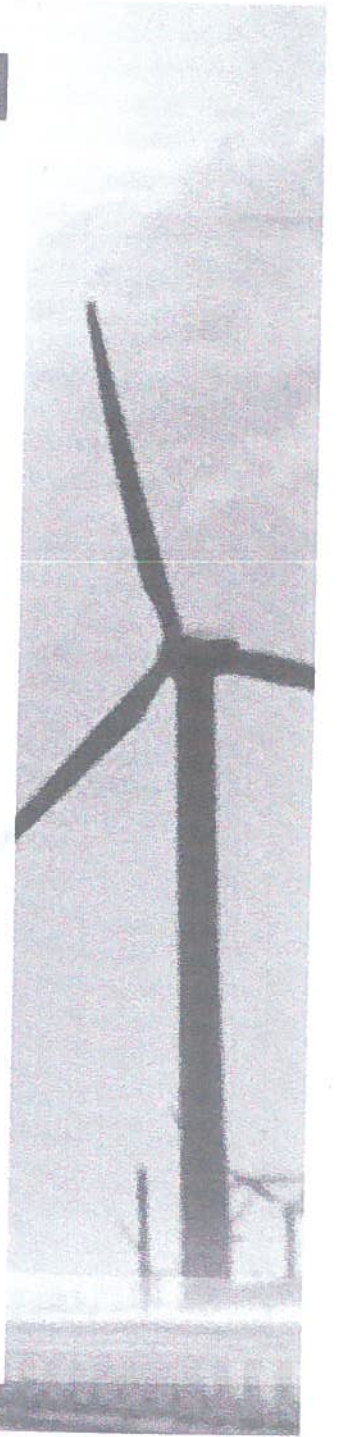




## **Accurate wind LCOE must include a % fossil**

**If we wish to make LCOE comparisons meaningful, wind must be made dispatchable by attaching it to a primary fossil source which furnishes the bulk of the electricity in the pair.**

**When the costs that wind imposes on the primary fossil sources (among other costs) are included:**



# Wind+coal "storage"=\$190-194/MWh

	Table 7. Levelized Cost of Wind Added to Coal	EIA (\$/MWh)
	Wind LCOE, from Table 4, line 4	101
	Costs Imposed on Primary Plants (from Table 2, line 1)	
3	Capital Recovery * 75%	+49
3	Fixed O&M * 75%	+3
3	Variable O&M * 75%	+3
4	Additional fuel consumption, assuming wind saves 50-70% and the delivered price of coal = \$2.60 per million Btu	+7-11
5	Transmission cost, derived from EWITS, as described	+15
6	Transmission losses	+12
	<b>Total</b>	<b>190-194</b>

*The Hidden Costs of Wind Electricity*  
<http://www.atinstitute.org/wp-content/uploads/2012/12/Hidden-Cost.pdf>



# Wind+gas "storage"=\$149-153/MWh

Table 4. Levelized Cost of Electricity for Wind Added to Combined-Cycle Natural Gas		EIA (\$/MWh)	EPRI (\$/MWh)
	EIA's wind LCOE, from Table 2, line 12	82	
	EPRI's wind LCOE, using EIA plant cost, capacity factor and transmission		93
1	<b>EIA, after matching EPRI's assumption for debt life (20 years)</b>	<b>93</b>	<b>93</b>
2	Using standard 20-year depreciation, as opposed to special 5-year	101	101
	Costs imposed on primary plants (from Table 2, line 4)		
3	Capital Recovery * 75%	+13	
3	Fixed O&M * 75%	+1.5	
3	Variable O&M * 75%	+2.3	
4	Additional fuel consumption, assuming wind saves 80-90% and the delivered price of natural gas = \$6 per million Btu	+4-8	
5	Transmission cost, derived from EWITS, as described	+15	
6	Transmission losses	+12	
<b>Total</b>		<b>149-153</b>	<b>149-153</b>

*The Hidden Costs of Wind Electricity*

<http://www.atinstitute.org/wp-content/uploads/2012/12/Hidden-Cost.pdf>

**At \$149-194/MWh, both are far more expensive than all current dispatchable generation including Advanced Coal w/CCS:**

Plant Type		Capacity Factor (%)	Levelized Capital Cost	Fixed O&M	Variable O&M	Fuel	Trans-mission	Total Levelized Cost
Dispatchable Technologies								
1	Conventional Coal	85	64.9	4.0	4.2	23.2	1.2	98
2	Advanced Coal	85	74.1	6.6	6.9	22.2	1.2	111
3	Advanced Coal w/ CCS	85	91.8	9.3	8.0	28.4	1.2	139
	Natural Gas							
4	Adv Combined Cycle	87	17.5	1.9	3.1	39.3	1.2	63
5	Adv CC w/ CCS	87	34.3	4.0	6.4	44.2	1.2	90
6	Combustion Turbine	30	45.3	2.7	14.7	61.7	3.6	128
7	Adv Combustion Turbine	30	31.0	2.6	10.0	54.7	3.6	102
8	Advanced Nuclear	90	87.5	11.3	2.0	9.6	1.1	111
9	Geothermal	91	75.1	11.9	9.6		1.5	98
10	Biomass	83	56.0	13.8	5.0	39.3	1.3	115

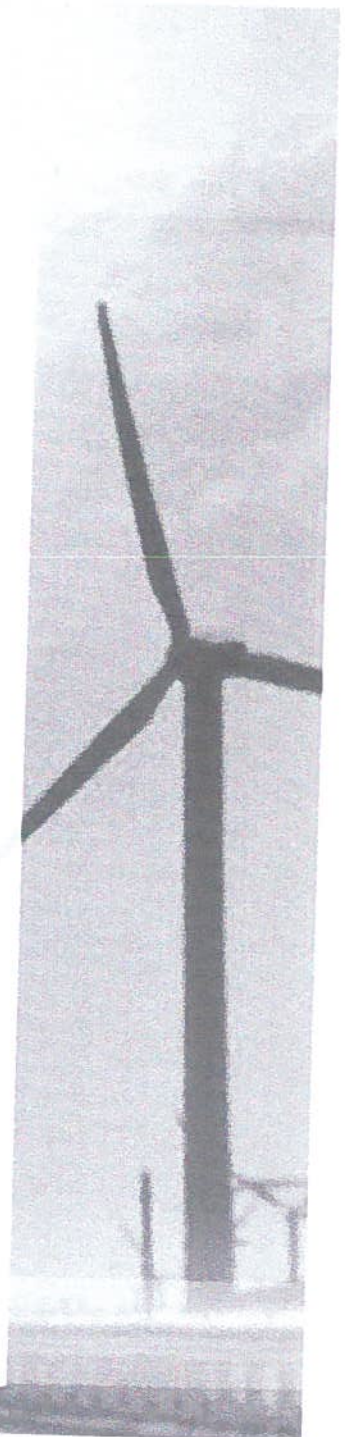
*The Hidden Costs of Wind Electricity*

<http://www.atinstitute.org/wp-content/uploads/2012/12/Hidden-Cost.pdf>



## **A better solution...**

**If a goal of Michigan energy policy is to reduce coal emissions, the Act should be reconstructed in such a fashion that it rewards the technology that brings those emissions reductions to the market in the shortest amount of time and for the lowest cost and to require empirical measurement of those reductions so that a proper cost/benefit analysis can be performed.**



# Avoiding Coal Emissions @ \$5.00 nat gas

	<u>CO2</u> <u>reduction/Mwh</u>	<u>Hg avoided</u>	<u>PM2.5</u> <u>avoided</u>	<u>LCOE @ \$5.00 Nat Gas</u>
CCGT	60%	100%	99%	\$56
Nuclear	100%	100%	100%	\$111
CCGT+wind	70%	100%	99%	\$84
Current portfolio+wind	unknown	unknown	unknown	unknown

Source: The Hidden Costs of Wind Electricity

- Replacing coal with CCGT eliminates PM2.5 and Hg emissions from coal and avoids 60% of CO2.
- Adding wind to CCGT only avoids an additional 10% CO2 emissions but increases costs of electricity by ~50%
- Despite \$2.5 billion of wind + transmission in MI we have no accurate cost/benefit numbers for our current wind mandate.



# What about \$15.00 nat gas?

	<u>CO2</u> <u>reduction/Mwh</u>	<u>Hg avoided</u>	<u>PM2.5</u> <u>avoided</u>	<u>LCOE @ \$15.00 Nat Gas</u>
CCGT	60%	100%	99%	\$123
Nuclear	100%	100%	100%	\$111
CCGT+Wind	70%	100%	99%	\$131
Current portfolio+wind	unknown	unknown	unknown	unknown

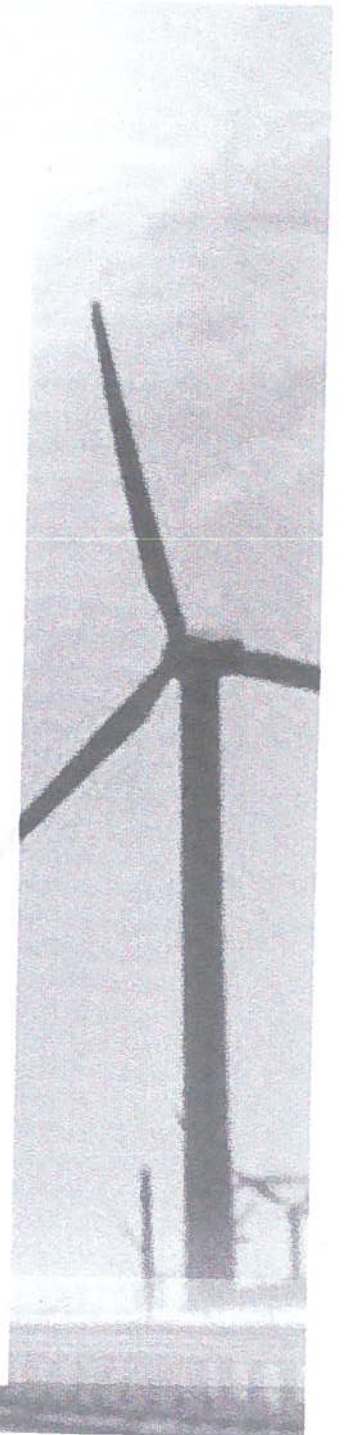
Source: The Hidden Costs of Wind Electricity

- With \$15.00 gas, nuclear is now cheaper than CCGT+ wind and eliminates all 3 emissions.
- Under neither gas price scenario is CCGT + wind the cheapest means of avoiding emissions.

# **Final Hurdle: Low Energy Density**

**“Wind’s real firm capacity value compared to nameplate rating is about 1/10 of its thermal counterparts, while causing industrial noise and visual pollution over more than 100 times as much land per nameplate MW. This means the industrial intrusion of wind is 1,000 times that of coal, nuclear and natural gas plants according to its ability to replace the need for them.”**

**Tom Stacy, ratepayer advocate**





# Replace nuclear generation?



- **Fermi II Reactor- ~1100 Mw-1 square mile**

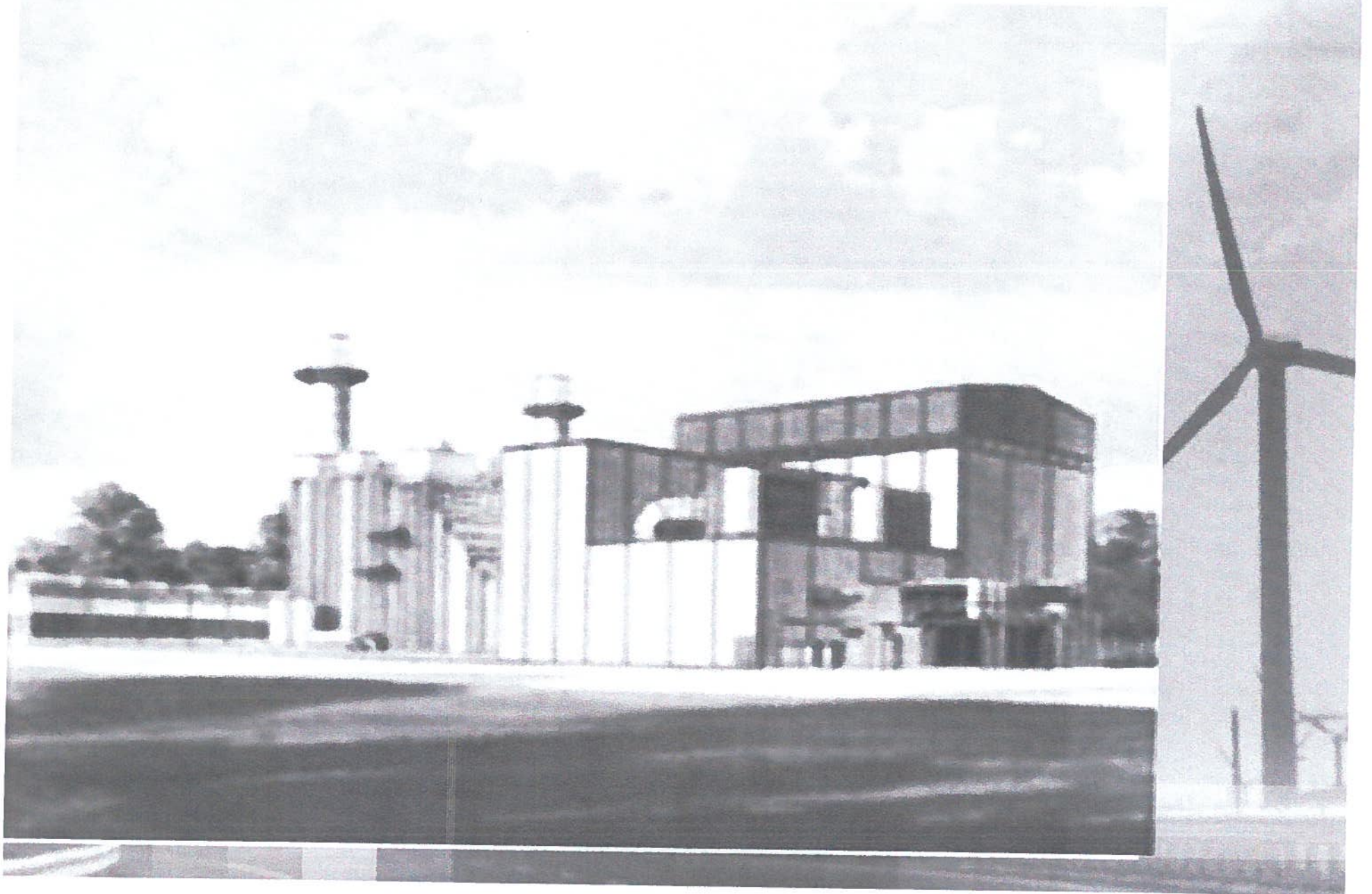
# 1100 MW from wind at 3.6 MW/sq mile w/30%CF



2 Vestas V-100 turbines per square mile

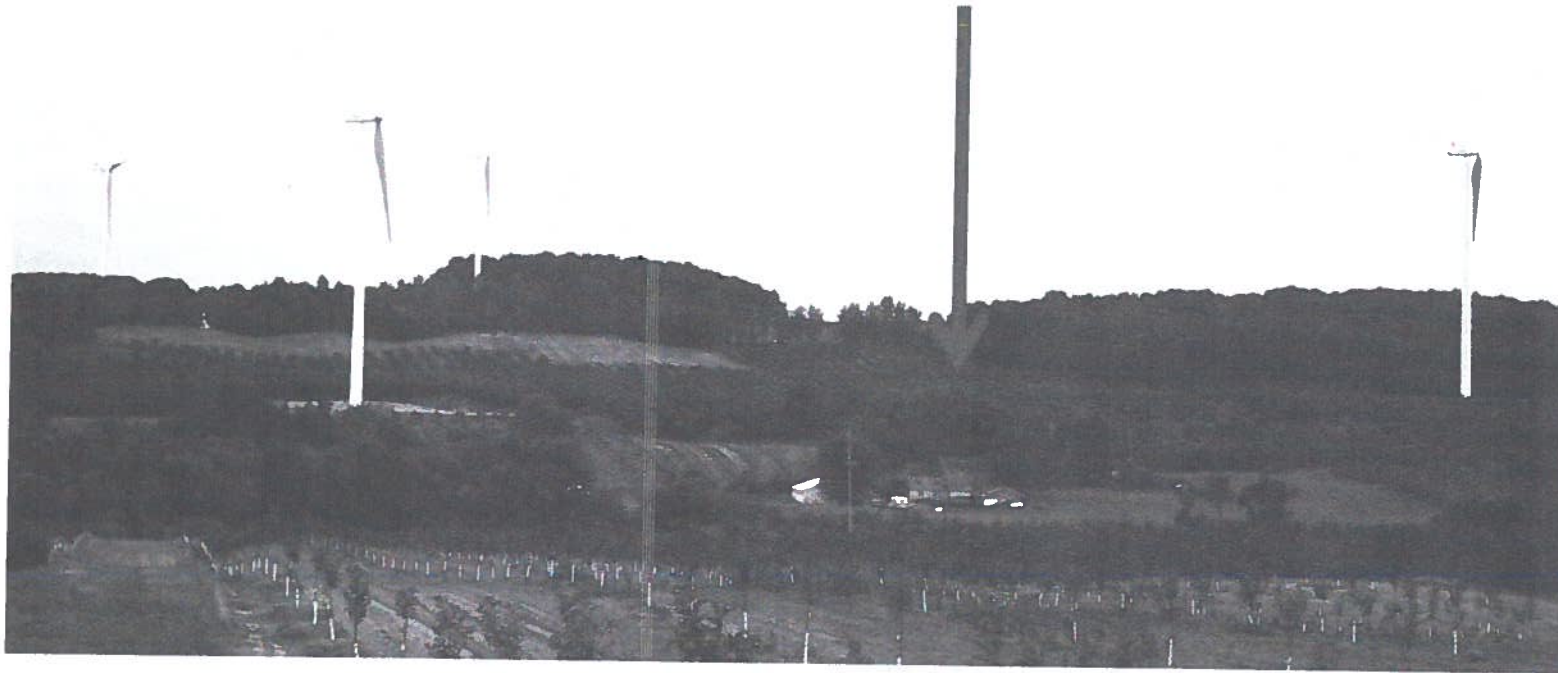


**....and a couple of these for July and August**

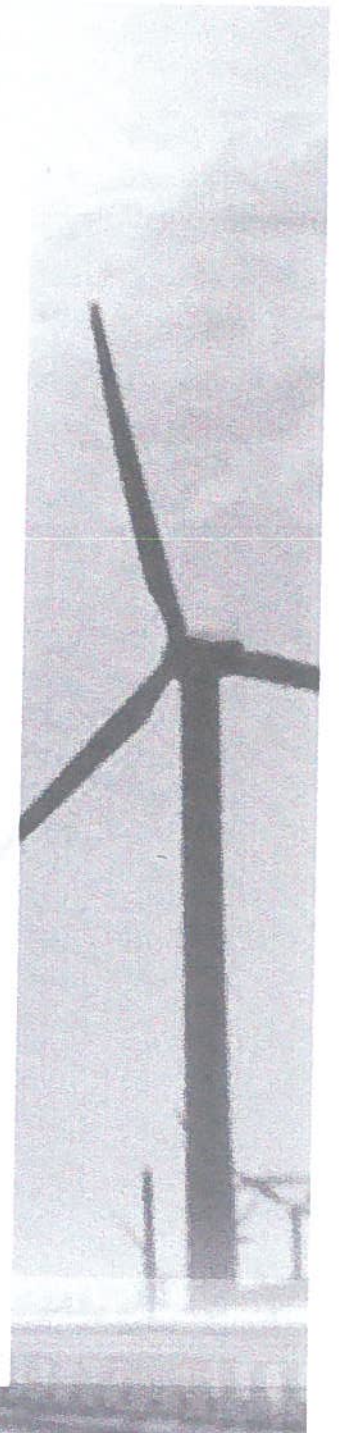


**Consider: 1 township worth of this...**

Shinelandecker  
Home  
Mason County



56 V-100 turbines at 25% Capacity Factor. (25% CF is measured MI CF for first 6 months of 2012.)





**BTW:**

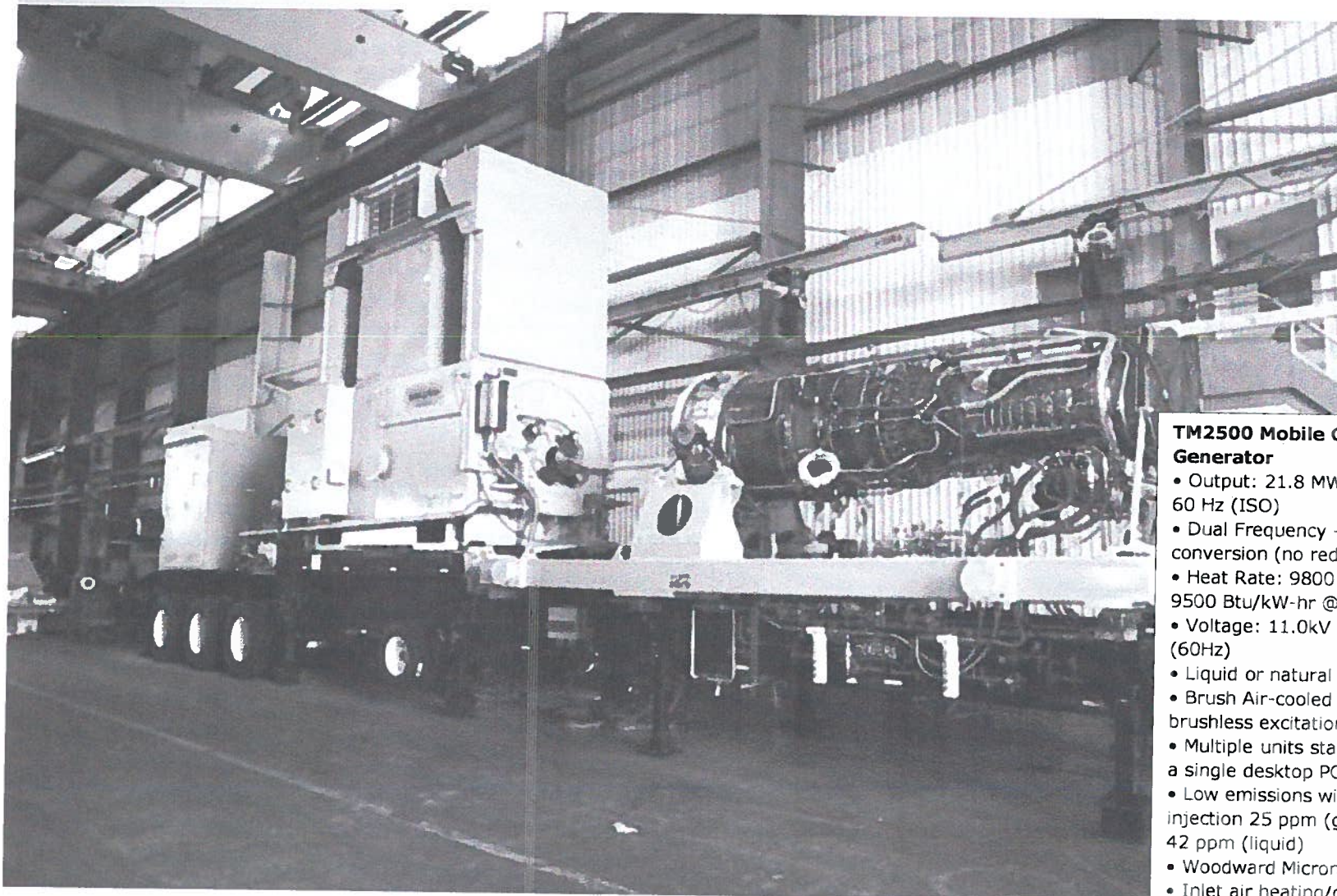
Shineldecker  
Home  
Mason County



Last week the Mason County Planning Commission passed a unanimous resolution declaring the CMS Lakewinds project out of compliance with the County's zoning ordinance due to excessive noise.

Reduced power output is the only known mitigation but brings a catastrophic effect on LCOE.

...could be replaced by one of these:



**TM2500 Mobile Gas Turbine  
Generator**

- Output: 21.8 MW @ 50 Hz; 22.8 MW @ 60 Hz (ISO)
- Dual Frequency – 50/60 Hz quick conversion (no reduction gear)
- Heat Rate: 9800 Btu/kW-hr @ 50 Hz; 9500 Btu/kW-hr @ 60 Hz (ISO)
- Voltage: 11.0kV (50Hz); 13.8 kV (60Hz)
- Liquid or natural gas fuel capability
- Brush Air-cooled 2-pole generator with brushless excitation
- Multiple units started/controlled through a single desktop PC
- Low emissions with demineralized water injection 25 ppm (gas); 42 ppm (liquid)
- Woodward Micronet® control system
- Inlet air heating/cooling provisions
- Electro-hydraulic starting system
- Single unit footprint ~110' x 70'
- Sound level at 3 ft. 90 dBA



# Likewise Gratiot County...





# Huron County...



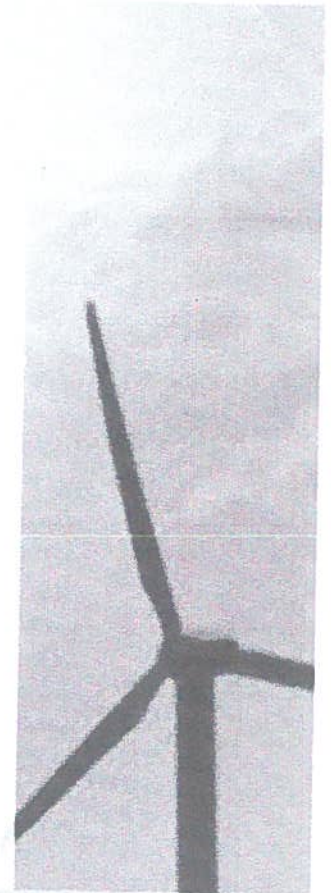


**...and Missaukee County.**



**In fact...**

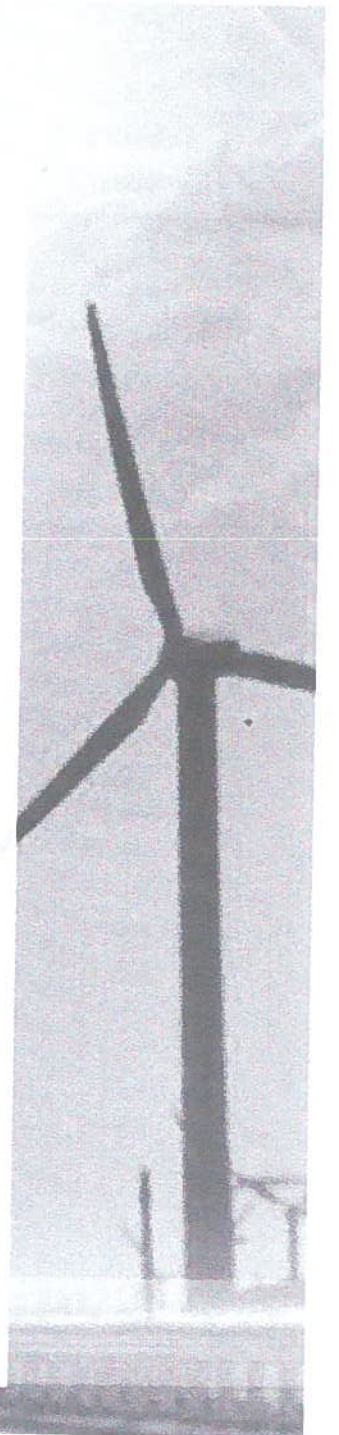
**CMS Energy's Thetford CCGT plant, if dispatched as baseload generation, would produce far more energy at a lower cost while also reducing more emissions than all the wind generation constructed in MI since PA295's adoption.**





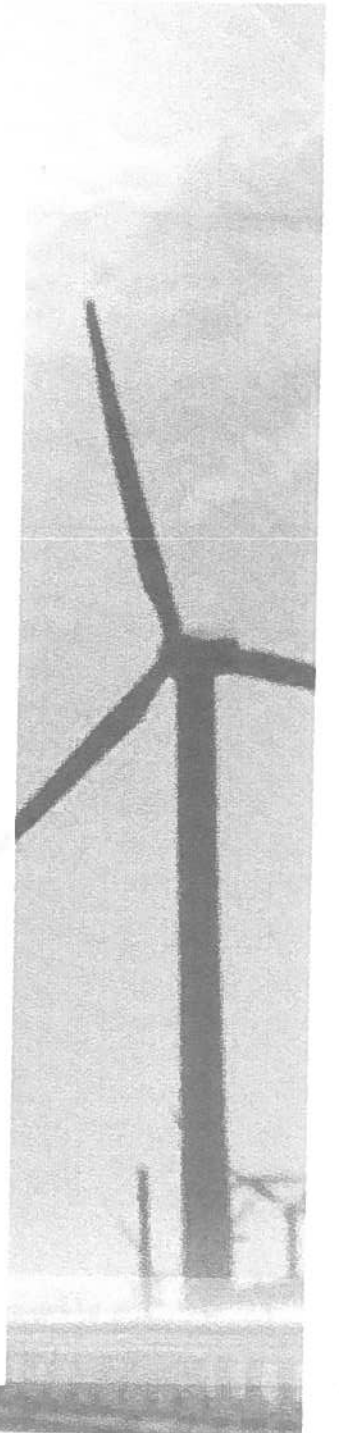
# **Conclusions:**

- 1. PA295 has unconstitutionally mandated instate generation of renewable energy, thereby illegally preventing typically far cheaper out-of-state providers of renewable energy from entering our market.**



# **Continued....**

**2. PA295 has failed to require empirical measurement of emissions avoidance nor to calculate a cost-per-unit-avoided thus leaving ratepayers and policy makers in the dark regarding the efficacy of the Act's stated goal of improving air quality in the most cost effective fashion.**





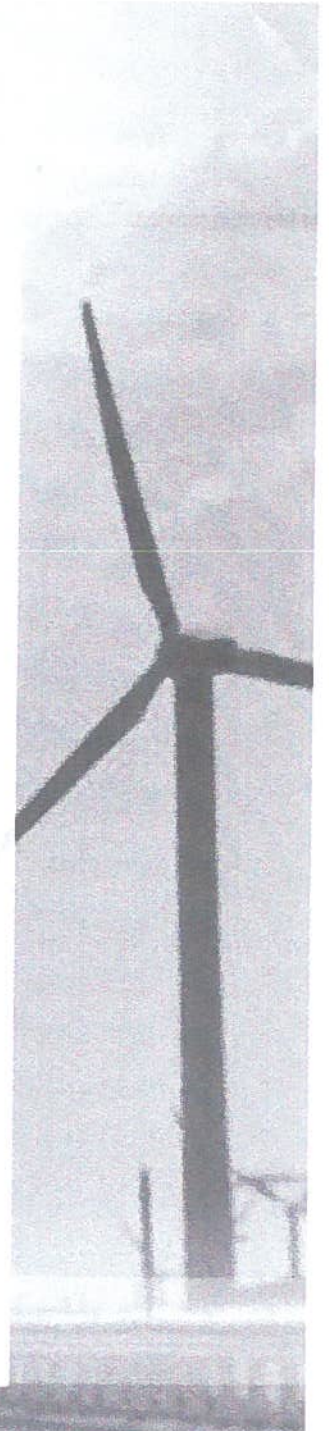
## **Continued....**

**3. PA295 has codified an economically invalid cost comparison between “new coal” generation and wind generation, thereby giving wind promoters an invaluable piece of false propaganda stamped with MPSC’s seal of approval.**



# Continued....

**4. PA295 and its *de facto* wind mandate has devastated our rural regions with massive industrial wind projects that even the National Academy of Sciences concedes is an expensive and dubious means of avoiding emissions.**





# **Final Question:**

**If wind energy is  
unable to cost  
effectively reduce  
the “externalities” of  
our current  
generation portfolio  
OR deliver cheaper  
electricity,  
why should anyone  
have to live like this?**



## **About the presenter:**

**Mr. Kevon Martis**

**BA-University of MI-1989**

**Lenawee County Rural Land Use  
Committee-vice-chairman-2007-09**

**Riga Township Planning  
Commission-Vice-chairman 2005-  
2011**

**Interstate Informed Citizen's  
Coalition, Inc. Founding Director  
2011-present**

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